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THE UNIVERSITY OF THE STATE OF NEW YORK

BULLETIN TO THE SCHOOLS

March
1941

ARBOR DAY AND BIRD DAY

What does he plant who plants a tree?
He plants, in sap and leaf and wood,
In love of home and loyalty
And far-cast thought of civic good—
His blessings on the neighborhood,
Who in the hollow of His hand
Holds all the growth of all our land—
A nation's growth from sea to sea
Stirs in his heart who plants a tree.

Henry Cuyler Bunner

THE UNIVERSITY OF THE STATE OF NEW YORK
BULLETIN TO THE SCHOOLS

Issued monthly during the school year by the State Education Department

CHARLES F. PROBES, *Editor*

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The University of the State of New York

Bulletin to the Schools

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ARBOR DAY AND BIRD DAY PROCLAMATION

This being the first time that the duty has devolved upon me to designate the particular days to be observed as Arbor Day and Bird Day, it has occurred to me that it may be well to note briefly the origin of these days and the purpose and objects of the originators in order that we may find our bearings and chart our course.

Over half a century ago the Legislature established Arbor Day and mandated its observance. Dr Andrew S. Draper, who was State Superintendent of Public Instruction at that time, interpreted the purposes and objects in his first proclamation as follows:

> The primary purpose of the Legislature in establishing Arbor Day was to develop and stimulate in the children of the Commonwealth a love and reverence for Nature as revealed in trees and shrubs and flowers. In the language of the statute, "to encourage the planting, protection and preservation of trees and shrubs" was believed to be the most effectual way in which to lead our children to love Nature and reverence Nature's God and to see the uses to which these natural objects may be put in making our school grounds more healthful and attractive. The opportunity should not be lost, which is afforded by the occasion, for illustrating and enforcing the thought that the universe, its creation, its arrangement and all of its developing processes are not due to human planning or oversight but to the infinite wisdom and power of God. Our school exercises and particularly those of an unusual character should be interspersed with selections, songs and acts which will inspire patriotism.

At this time of worldwide trouble and strife I fervently hope that we may humbly rededicate the day to these sentiments and place paramount emphasis upon love of God and Country.

The record discloses that Bird Day is not established by legislative action. It originated in 1915 as a result of a paper on the economic value of birds delivered by Mrs H. J. Blatner, a member of the Dana Natural History Society of Albany, New York. Apparently the suggestion received favorable consideration by Dr John H. Finley, then Commissioner of Education, who writing in relation to this day said: "The State will be made richer by many millions and a great source of human happiness will be kept at our doors," and Dr John M. Clarke, Director of the State Museum, wrote of that first Bird Day: "This is to be our Bird Day this year and in years following the birds shall have their day in our schools just as the trees have long been having theirs."

Each year since that time the Commissioner of Education has designated a day to be observed as Bird Day. This year I have the honor to designate Friday, April 18th, for observance as Bird Day and April 25th, May 2d or May 9th, as best suits the convenience of each locality, for the observance of Arbor Day.

ERNEST E. COLE
Commissioner of Education

PRIMEVAL FORESTS AND THE MODERN WORLD

DR ROGERS MC VAUGH, UNITED STATES DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.

In this year 1941, more than three centuries after the first white settlers came to this part of America, it is difficult for us to understand the conditions those settlers found, or to see the things their eyes must have seen. Today we ride to school or work over smooth hard roads; in summer or in winter we live in houses that are not too warm and not too cold; from our windows we see well-kept orchards and fields, and prosperous flocks and herds; where the country is hilly and rugged there are occasional patches of woods which give us firewood and perhaps add beauty to the landscape.

Let us now turn to the New York of 1650, when there were but few white settlements and these huddled close along the Hudson river. Travel was hard; there were yet no roads and the river itself was the main thoroughfare; houses were far apart and those who lived in them kept warm in winter only by toasting alternate sides of their bodies at the huge wood-burning fireplaces; above all, however, the scene of 1650 must have been dominated by the forest which towered over all and extended no man knew where.

The primeval American forest must have seemed like a living and marvelous thing to those early European settlers. From it came their meat before their herds were well established; from it came their building materials in seemingly endless amounts: soft pine and hemlock for clapboards and cheaper furniture, maple and oak for finer work, beautiful walnut and cherry for the pieces which are now so highly prized as antiques. The forest must have seemed a sinister thing sometimes as well, for from it came enemies, both white and red.

We may imagine a trip to one of these early New York forests, if we can. Over our heads tower immense pines and hemlocks, some of them more than 200 feet in height and so huge that three of us can scarcely encircle them with our arms. Underfoot is a carpet of needles into which our feet sink soundlessly. Our progress is impeded by creeping yew bushes and the viburnum which is still called "hobblebush." It is dark in the forest, so that we see none of the plants of open fields with which twentieth-century folk are familiar; instead we find countless thousands of painted trilliums and purple lady's-slippers and dainty oxalis with its peppermint candy stripes on the flowers, and goldthread with its delicate white blossoms and its brilliantly golden underground stems. We have left our horses behind, for so dense is the forest that it is easier to force our way through on foot.

Now, with an abrupt change of time, let us return to the twentieth century. The last of the mighty forest has gone; the pioneer was impatient with it because it stood in the way of his crops, and he cut and burned wastefully, with no eye for the future; here and there the ax has spared a remnant, but in New York we must go to the more rugged and mountainous districts to see these. The seemingly endless supply of wood has dwindled to nothing; the once abundant game animals have gone far ahead afield or been exterminated in this State; with the cutting of the forests has come steadily increasing sterility. Where rains

once were held by the huge amounts of humus in the forest cover, they now run off across our fields and carry with them into the creeks and rivers ever increasing amounts of our rich top soils and expensive fertilizers. Lands unsuited for agriculture have often been denuded of their original forest cover and now stand idle.

This is a good season in which to let our thoughts turn to the forest and the benefits they may bring us. It may be that we shall find them necessary to our happiness and well-being. Vacant and unused fields and pastures will assume a new importance if they are covered with growing forests. The Indians have gone forever and the roads apparently have come to stay forever, but it is to be hoped that some of us will live to see the day when some of these new forests tower overhead and promise good things for the future. It may be that we shall not see this day, but our children or their children will gain pleasure and contentment and safety and perhaps a livelihood from the trees which are planted by the present generation.

THE VALUE OF TREES

R. D. ADOLPH, PALISADES INTERSTATE PARK

A forest is not a small patch of woodland but a large area of mountains, lakes and streams. The region making up the Bear Mountain-Harriman Section of the Palisades Interstate Park has an area of about 72 square miles and embraces the most rugged part of the Hudson highlands. Bordered on the east by the Hudson river, this area is from its southern limit only 35 miles from New York City; it extends north to the town of Cornwall and west to the Ramapo river. The mountains with steep slopes and narrow valleys, in this undeveloped region, range from 900 feet to 1380 feet in elevation above the Hudson.

The forest covering this region is made up of oak, ash, maple, hickory, beech etc., intermixed with such soft woods as pine and hemlock. Human protection of the forest during a period of 30 years has given Nature, the master landscape artist, the necessary assistance in its great stride toward the development of a forest primeval.

Man as a landscape artist assembles in an area plants selected for their beauty. He designs the planting, keeping in mind the value of the selected species as to color and fragrance of bloom, foliage, size and form. The colors must blend, and species are selected so that the time of bloom will be spread as much as possible through the season. The seasonal foliage changes in shrubs and trees, ranging from the light green foliage in the early spring through the deep green of summer to the final autumn colors before the leaves are taken by the frost are extremely important factors.

In landscape areas, where man has assembled many species of plants from many plant communities, all grow under the same conditions. This is possible only with man's help. In the 72 square miles of park forest, a wide range in species of plants, in natural occurrence, carries on with no other help from man than protection.

Highland Vista in the Bear Mountain-Harriman State Park

Here in this wild life sanctuary, where hunting is forbidden, many species of mammals and birds exacting in habitats may be seen. Such animals as the beaver and deer are now, after many years of absence, as well established as they were before the white man appeared. It is this wilderness aspect of the park that is attractive to people of all ages and all walks of life. The motorists, the hikers, the campers, the fishermen, the nature study groups and many others including those interested in winter sports find in the park a place for their desired recreation.

In the spring the people in their town and city homes are eager to get out-of-doors after the winter months. The freshness of the new tender foliage of the forest is soon followed by a succession in bloom of trees, shrubs and ground plants. The Amelanchier coming into bloom in the first week in May, the dogwood followed by the azalea in the middle of May, the tulip, poplar and mountain laurel the first week in June and many other striking flowering trees and shrubs add great scenic beauty to this wilderness park.

During the spring months the motorists and hikers start their season of recreation. The scenic park drives, winding through the park from river level along lake borders through valleys and over mountain ridges, offer the motorist constantly changing scenic views. Motoring over the restful park drives in the forest the motorist escapes the rush and tenseness of driving along the commercial highways. Instead of electric and telephone

lines along the roads, the drives are bordered by trees and plants of the forest, recalling the restful roadside scenes of a past generation. Wild animals and birds, protected from the chase, are commonly seen along the road borders and add much interest to the natural scene.

Picnic groves, situated in attractive surroundings, bordering lakes and streams, are easily accessible from the park drives. Fireplaces, tables and benches, drinking fountains and other facilities in these well-shaded picnic groves are attractive stopping places for a picnic lunch or for the day.

In the early days of spring the hikers again start their season of roaming through the forest. The group referred to as hikers includes both those persons who walk for the exercise and the nature study groups. The need for hiking trails in the forest was felt many years ago when the popular use of the automobile and improvement of highways robbed the country roads of their natural scenic beauty. People walking for exercise and nature study turned their attention to the trails in the forest.

Nine marked trails varying in distance from 12 to 21 miles, as well as many shorter trails, attract thousands of people to this type of recreation. Hikers get the greatest appreciation of the wilderness beauty in this rugged region while roaming the trails along the mountain ridges and through the most remote forest areas, far from the park drives and other highways.

The botanist, the ornithologist, the entomologist, the geologist, the dendrologist and many others, not forgetting the camera fans, find much to engage their interest. Even the swamp, usually thought of as only a mosquito-infested area, is appreciated for its spots of beauty and wealth of plant and animal life. To those hiking or rambling through the woodland along the trails, the trail shelters and fireplaces are a welcome sight when it is time for a rest and lunch.

The most intensive recreational use of the forest is through the period from May until late September, while the recreation centers and camps are open for the summer months.

The recreation centers at Bear Mountain and the beaches at the park lakes are comparatively small areas in the forest. Bathing, fishing, boating, hiking and such forms of recreation, in keeping with and not marring the wilderness beauty of the forest, are enjoyed by thousands of visitors from New York City and other large cities within a radius of 100 miles. These recreation centers are so located that boat and train transportation as well as transportation by automobile makes it possible for even those of limited financial means to avail themselves of these facilities in the forest.

Ninety-seven organization camps, housing a constant summer population of 8000 campers, are attractively situated in the forests bordering the shores of 16 of the park lakes. The camp units, of frame construction, are rented by the commission to organizations doing social, charitable or philanthropic work in the cities. Children and adults find in the average vacation of two weeks of camp life in the forest an interest in surroundings alien to the daily life at home. This interest in the forest, in the plant and animal life and in its value to man is stimulated by the staffs of the regional camp museums in the camping sections and the Trailside Museum at Bear Mountain.

The hustle of closing camps at the end of the summer vacation season marks the

beginning of Nature's glorious color pageant. The many species of trees have not yet bared the tracery of their branches to the coming winter but are changing the color of their leaves, shooting threads of gold and streaks of crimson along their veins, and bringing the whole of the delicate network into the prominence of yellow on a groundwork of pale green.

It is through this witching charm to the calm landscape of October that the forest comes into its greatest glory. No two species of trees exhibit the same appearance as they do in summer. The late season brings out their individual character. The pines and hemlocks in their somber foliage stand out in sharp relief in the setting of hardwood trees decked with glowing colors of crimson, scarlet, brown and gold.

In the autumn season the miles of gaily colored trees as viewed from the park drives through openings in the forest, along the lake borders and from high elevations attract thousands of motorists to this scenic region.

The closing of camp and recreational facilities in September leaves the forest to the hikers and motorists until the time of low temperatures of the approaching winter. In December, when the lakes are covered with ice and a blanket of snow

Forest Ranger Distributing Food for Snowbound Deer in the Bear Mountain-Harriman State Park

covers the forest floor, the forest is a popular place of recreation for winter sports.

Twenty-five years ago the number of persons seeking recreation in the forest presented a new problem of forest protection. Unlike the "woods wise" natives in the country, city-bred people, coming to the forest for recreation, knew little of proper woods conduct. A more intensive program of education in conservation, keeping up with the increased use of the forest, has been most helpful, in general, to conservation.

TREES FROM MARCY TO MANHATTAN

DR F. E. EGLER, NEW YORK STATE COLLEGE OF FORESTRY, SYRACUSE

Have you known that in making a trip from Mount Marcy in the Adirondacks to the islands around New York harbor your journey in many ways would be comparable to one from the shores of Hudson bay to the coastal plain of Virginia?

We find this remarkable variation because trees are almost human in the sensitiveness of their reactions to the surroundings, especially temperature, and because New York State has an extraordinary range of climates, varying all the way from one of arctic frigidity on the summits of the Adirondacks to southern warmth at New York harbor. How is it possible to have within the confines of a single state such a wide variety of temperature conditions?

If New York were devoid of mountains, plateaus and deep basins, the flatness would be most monotonous, but the study of its forests would be far simpler than what actually occurs. If such a flat area were as large as a continent and one were to travel anywhere from the south to the north, he would pass through successively colder climates. The great temperature belts that we learn in grade school geography — the Tropic Zone, the Temperate Zone and the Arctic Zone — would be found very useful in mapping the general weather conditions of this land. Stretching from the Atlantic west to the Pacific, the lines of separation between these zones would always follow the lines of latitude.

But our country is not flat. Primitive man, and all men since, have noticed that as one climbs some of our higher mountain ranges, the climate becomes colder and colder. The changes he experiences are more or less comparable to those he would undergo if he were to travel north along the lines of longitude.

We thus find that two different factors, latitude and altitude, working separately or together, are primarily responsible for the general temperature conditions of places in the State. The farther north one goes, the colder it is; the farther up one goes, the colder it is. Sometimes one factor is much more important than the other. For example, if one were to travel from the New Jersey beaches south to the Carolina mountains, the change in altitude is more significant than the decrease in latitude, and the climate is colder, just as if one were to go north along a sea-level route. Most fortunately, New York possesses such a variety of topography — from land at sea level to

mountains over 5000 feet high — and such a latitudinal spread, that most of the climates of northeastern North America are represented within our confines.

During the several million years that our northeastern trees and their ancestors have lived on the face of the earth, they have become remarkably adapted to the temperatures around them. Some demand cold weather during the winter in order to grow and reproduce later in the season; others are destroyed by the same cold. Some demand a certain amount of hot weather for their perpetuation; others are destroyed by the same heat. And so, through the ages, we find not only that certain types of forests have developed under certain temperature conditions, but that these occur in east-west bands in flat country, and in altitudinal bands in mountains. Thus it is to be expected that the great variety of temperature conditions within New York is reflected in a great variety of forests. Let us make the trip from Marcy to Manhattan.

The Tundra

On the summits of Mount Marcy, of McIntyre and of Whiteface, and to a lesser degree on other high peaks, occur the fragments of a great vegetation type that is widespread in the far north. Around the shores of Hudson bay and north beyond the limits of tree growth, lie these Barren Grounds of Canada. They are vast expanses of plainlike vegetation, of sedges, grasses and small herbs that have unusually large flowers. Fields of broken rock often occur, and in other parts swamps filled with sphagnum extend for miles. We find these barren grounds extending southward only on the highest mountains, on the peaks of New Hampshire and, in the West, down along the Rockies and on the summits of the Cascades. It is not only in this continent but also across northern Europe and in a broad swath across Siberia that the tundra occurs, essentially unchanged in floristic composition. On Marcy, and on other peaks, is a very typical assemblage of tundra species, including a dwarf rhododendron, a creeping willow, a strange clubmoss, the circumboreal diapensia, an arctic pink and many others that give the intrepid climber a true glimpse of the far north.

The Taiga

As one leaves the summit of Marcy and travels far down through the foothills of the Adirondacks, he passes through several forest types dominated by species essentially northern. The name "taiga" was originally applied to the vast forests of spruce, fir and aspen that lie in northern Siberia, from which it was extended to similar forests in Europe and then to those of America. In northeastern United States there are several belts of forest in the taiga, quite distinct from each other.

The Spruce-Fir-Birch Forest. From an elevation of 3500 feet almost to the summits at 5000 feet, and with a growing season of less than 100 days is a forest — often gnarled and dwarfed on the mountain slopes — in which three species predominate: red spruce, balsam and paper birch. Mountain ash is generally abundant, and such herbs as goldthread, twinflower, bunchberry and others. This forest is comparable to that which occurs in a large part of central Canada from the Atlantic west to the Canadian Rockies. Furthermore, in the mountain ranges extending southward and through Europe

and Asia one finds not the same species but such close relatives that even the botanist must sometimes look carefully to distinguish between them.

The Spruce-Northern Hardwood Forest. As one progresses lower in elevation down through the foothills into a region where the growing season varies from 100 to 130 days, many changes occur. Additional species are added to the forest, including sugar maple, beech, yellow birch, hemlock and white pine. Below these mixed forests three herbs are exceedingly abundant and serve to characterize it: shield fern, clubmoss and wood sorrel. The hobblebush is seldom absent from this type. Many of the old fields are covered with solid stands of red spruce. Seedlings of this species are not eaten by cattle, and consequently it becomes abundant on pastured lands. Many bogs are present which are covered with forests of larch and black spruce or with a scrub of heathlike plants. This type of boreal forest one may find, with relatively few changes, west to Lake Superior and south in the Appalachians almost to Georgia.

Courtesy of State Conservation Department

Typical Growth of Hardwood

The Pine-Northern Hardwood Forest. The next type of forest one encounters on his way southward — one that is found through a large part of the Appalachian plateau of New York where there is a growing season up to 150 days — is dominated by beech, maple, yellow birch and hemlock, with white pine occurring irregularly. Red spruce, balsam, paper birch and mountain ash no longer are found, while the understory is much enriched by almost a hundred species of flowering herbs. This is one of the most widespread forest types in the Northeast, covering many acres in the Lake States, Pennsylvania, New England, and down the Appalachians even into Georgia. In this zone in New York, white pine is one of the most aggressive, unpalatable plants that appears in the old pastures, and consequently many of our white pine stands are to be traced back to such an origin.

The Oak-Hickory Forests

Once we enter the region of these forests, where the growing season is 160 to 180 days, there are great changes in the composition of the forests. Beech, maple, yellow birch, hemlock and white pine are no longer dominant, while other species, appearing for the first time, are abundant. These latter include many species of oak, hickory, red cedar, butternut, black walnut, tulip tree, sassafras, sycamore, dogwood, and probably 20 other common trees, all generally southern in distribution. The understory of this forest is extraordinarily rich in spring flowering herbs, and early in the year before the leaves are out, a vast carpet of trilliums, Dutchman's-breeches, squirrel corn, toothwort, adder's-tongues, jack-in-the-pulpits and many others, decorates the forest floor. Then again, around Albany, there are extensive plains of coarse sterile sand that bear multitudes of pitch pines, prairie beard grass and plants that we find again only in the unique Pine Barrens of New Jersey. In New York, these types occur largely in two regions, in the plains south of Lake Ontario, and in the Hudson River valley northward to the region of Lake Champlain. If one were to travel to Europe or to eastern Asia, he would find close counterparts of these forests also, with closely related species of plants.

The Coastal Plain Forests

The end of our journey from Marcy southward is near Manhattan, at Staten Island, where the length of the growing season has increased up to 200 days. In this corner of New York State, as well as along the south shore of Long Island, we can find a whole host of plants that are typical of the coastal plain far to the south, some indeed being found even in Florida. The shortleaf pine is found here, the southern white cedar, the sweet bay, the holly, the willow oak, the red gum and many interesting herbs and shrubs. The fact that these islands are within the influence of metropolitan New York is responsible for the destruction of all the original forest types. On the other hand, for the naturalist who is willing to look for his plants, there is much exotic southern life in these regions.

In this hurried trip from Marcy to Manhattan, we have traversed a gamut of vegetation types that have their several counterparts dispersed all over eastern North America, from Hudson bay to Florida. From the mountain tops to the ocean beaches, it is seen that we possess an extreme diversity of climatic conditions, and thus there is a wealth of plant life, far greater than one would think possible purely from our northern position in the United States.

WILLIAM F. FOX, PIONEER IN FORESTRY

RALPH S. HOSMER, PROFESSOR OF FORESTRY, NEW YORK STATE COLLEGE OF AGRICULTURE, ITHACA

Colonel William Freeman Fox

Organized forestry work under the auspices of the State Government began in New York in 1885. Of the men who helped to get this work actively under way and to carry it forward, Colonel William F. Fox stands out as one who is especially to be remembered. A far-sighted, efficient and faithful public servant, he richly deserves a place on New York State's Arbor Day Honor Roll.

The decade from 1881 to 1890 was a significant one for forestry in the United States. In those years popular interest in the protection and care of forests crystallized into a definite movement. This soon made itself felt in various parts of the country. Here in New York the chief efforts centered in plans for the preservation of the forests of the Adirondacks and of the Catskills.

The New York State Forestry Law of 1885 established the Forest Preserve. It also created the Forest Commission as a state bureau. With several changes of name during its earlier years, that bureau has functioned continuously ever since. From 1927 it has been known as the Conservation Department. To Colonel Fox is due no little of the credit for inaugurating the field work under the original Forest Commission. He performed that duty so well that the Division of Lands and Forests was able to withstand setbacks and, at time, active opposition.

Like other pioneers in the forestry movement in the United States, Colonel Fox was not a technically trained forester, nor did he ever claim to be. Indeed forestry as a profession dates in this country only from just before the turn of the century. But fortunately the movement for forestry never lacked leaders. It was because these men had vision, and were willing to work hard for what obviously needed to be done, that they accomplished what they did. Colonel William F. Fox, of New York, was one of this group, along with men like General C. C. Andrews, of Minnesota, and Dr J. T. Rothrock, of Pennsylvania. In their respective states each of these men did much to establish forestry on a secure foundation.

William Freeman Fox was born on January 11, 1840, in Ballston Spa, N. Y., a son of the Rev. Norman and Jane

(Freeman) Fox. On his father's side he came of a family that had for years been lumbermen in New York State, operating in the white pine area of the eastern Adirondacks. The custom of floating logs to the mill was first used by the Fox Brothers on the Hudson river in 1813. From that start developed the log driving on that river, which for 75 years supplied the sawmills at Glens Falls and still continues to deliver pulpwood for newsprint paper.

Trained for college at the Union Classical School in Schenectady, Fox was graduated from Union College in 1860, in the engineering course. He went to the Civil War as a captain in the 107th New York Volunteers, rose to the rank of major, and was again promoted, at the age of 23, to that of lieutenant colonel. During the winter of 1863 he was in command of the regiment. He was wounded three times.

Following the Civil War Colonel Fox was himself engaged for several years in rafting lumber on the upper Allegheny river, from points in Cattaraugus county, New York, to Pittsburgh and Cincinnati. He also had experience in the Lake States in buying and selling timber and timberlands. He was therefore familiar at first hand with all aspects of lumbering. This gave him a sympathetic understanding of the problems of the lumberman.

All this is made evident in one of his publications, History of the Lumber Industry in the State of New York, which is regarded as the authoritative text on that subject in this State. It was published in 1902 as Bulletin 34 of the then Bureau of Forestry (now the Forest Service) of the United States Department of Agriculture. Subsequent to his career in the lumber industry, Colonel Fox for a time practised his profession, civil engineering. Then in November 1885 he was appointed assistant secretary of the newly established State Forest Commission. As the commissioners served without pay, a large share of both the office and the field work fell upon him. Being a good executive Colonel Fox thus had much to do with the making of plans and with carrying them out. Under the several reorganizations of the commission Colonel Fox had various titles. From 1891 until 1909, under the Forest, Fish and Game Commission, he was known as superintendent of forests.

When the Forest Commission was established in New York in 1885 there were no precedents to guide its members in the setting up of a state bureau of forestry. But certain things called for immediate attention. Among these were the protection of the Forest Preserve from fire and from trespass, the increase of the Preserve area, and the education of the public as to forestry in general, and especially as to the need for its practice in New York State.

It was here that Colonel Fox's intelligent grasp of the situation and his executive ability came into play. He had, too, in large measure, the traits of initiative and perseverance, and above all, tact. He knew how to bide his time, but also how to be ever ready to take advantage of favorable occasions to build up support for the forestry work with the members of both houses of the Legislature. His genial personality made him many friends, as is attested by the fact that although holding a position subject to political appointment, he served the State for almost 25 years, without regard to shifts in party control.

Especially to be recalled as Colonel Fox's work are the setting up of an effective forest fire control organization, the systematization of the procedure for the purchase of lands for the Forest Preserve and the active prosecution of such land purchase, the compilation of the first accurate state land maps of the Adirondacks and the Catskills, and later the hearty support which he gave to the establishment of forest nurseries and reforestation.

Colonel Fox was quick to recognize the importance to the State of securing the services of professionally trained foresters, as they became available after the opening of the schools of forestry. Evidence of this was the appointment of Ralph C. Bryant in 1900, the first man to be graduated from the old College of Forestry at Cornell University, and later of Abraham Knechtel and Clifford R. Pettis, also from Cornell, as members of his staff. It was through Colonel Fox that the State of New York secured the cooperation of the then Bureau of Forestry of the United States Department of Agriculture in a two-year study of a tract of original forest in the Forest Preserve, near Raquette lake, in 1900 and 1901.

As assistant secretary of the Forest Commission, on Colonel Fox fell the brunt of the work in preparing the early reports, a duty to which he continued to give attention as long as he lived. He had much to do with the bringing out of the elaborate reports of the Forest, Fish and Game Commission between 1900 and 1909. These will be remembered for their beautifully colored plates of birds and fishes, which accurately reproduced the paintings of well-known wild life artists. Another helpful contribution was the series of tables in the annual reports that gave the output of timber from the forests of New York.

Over his own name Colonel Fox published in the annual reports of the commission a series of articles, some of which were later reprinted in pamphlet form for wider distribution. Among the more important of these were: The Adirondack Spruce, 1894; A History of the Lumber Industry in New York, 1902, already noted above; The Maple Sugar Industry, 1903; Tree Planting on Streets and Highways, 1903, this with eight colored plates which show accurately the autumnal colors of the leaves of 25 New York trees; and Forest Nurseries and Forest Nursery Methods in Europe, 1905.

Apart from his writings on forestry topics Colonel Fox is well known as an author because of his several authoritative books on military matters, particularly his Regimental Losses in the Civil War, 1889; New York at Gettysburg, 1900; Slocum and His Men; History of the Twelfth and Twentieth Army Corps, 1905, and Life of General Green. He was corresponding secretary of the Society of the Army of the Potomac, and president of the Society of the Twelfth Army Corps.

Colonel Fox died in Albany, N. Y., on June 16, 1909. In his passing the people of New York lost a trusted official and a loyal friend. From a broad background he brought to his duties as superintendent of forests a personality which gives to the work which he initiated stability and permanence. The many acres of forest land which were added to the Forest Preserve during his time are a fitting memorial to Colonel Fox for his well-directed efforts for the advancement of forestry in the State of New York.

INVITATION TO THE FEAST

MARGARET MC KENNY, CITY GARDENS CLUB, NEW YORK CITY

Building up an environment where the birds will find their natural food is the surest and best way to increase the bird population in a neighborhood. Artificial feeding during the winter is often absolutely necessary to save the birds, but a planting of fruit-bearing trees and shrubs not only gives birds food at the times when it is proper and natural for them to have it, but furnishes a thicket where many of them will nest and so give us the benefit and joy of their presence over a longer period of time.

There are two families of our native trees and shrubs bearing fruits which are prime favorites with the birds. They are the cornel or dogwood family and the honeysuckle family.

Of course as far north as it is hardy, the flowering dogwood, *Cornus florida,* is a universal favorite on the home grounds. In southern New York and on Long Island whole hillsides look as if drifted with a light fall of snow when it is in full flower; and on the lawn or massed against a dark background of

Courtesy of U. S. Biological Survey

Catbird in Honeysuckle Bush with Young Five to Six Days Old

Photograph by W. B. Wilder

The Berries of the Mountain Ash (Sorbus americana) are about the Size of Peas and Bright Red in Color

hemlocks there is no shrub in cultivation more beautiful than the dogwood in May. Then later the little four-petaled closely clustered blossoms, which have been widely advertised by the four snowy bracts, develop into the red fruits so loved by the birds. The fruit ripens in late September and October and is supposed to be held on the trees for some time. But the birds take care of that. An ecstatic chattering group of robins will float in from the North and soon the tree will stand stripped.

Another small tree of the same family is the alternate-leaved or pagoda dogwood, *C. alternifolia*. Not so frequently seen in cultivation as the showy flowering dogwood, it has a distinctive manner of branching in tiered whorls which is very attractive, and it is this tiered growth that gains it its popular name of pagoda. The small creamy-white flowers are set primly on the branches and in late August are succeeded by striking blue fruits on bright red stems. This dogwood is often shrubby in growth, and to look down on it from a window when it is in fruit is like looking at a brilliant mosaic. But soon, oh, very soon, the red stems are all that is left to tell the story, for no fruit

is more loved by the birds, nor more quickly spied by both residents and migrants.

A shrubby dogwood of the dry fields is *C. racemosa.* Its dense twiggy growth makes fine nesting sites and in summer it is set with white fruit. Near the streams and swamps we find the silky cornel, *C. amomum,* with dull white or cadet blue berries. The red osier, *C. stolonifera,* in the thickets near the lakes and marshes, glows crimson all winter and in August has masses of white fruit.

Then there is the honeysuckle family. What a feast its numerous members prepare for the birds! Take the viburnums alone. Some of them ripen early, others not until late in the fall, and some carry their fruit quite through the winter months. Often becoming a tree of 30 feet, we have the nannyberry, *Viburnum lentago.* Growing naturally on rocky hillsides in moist soil on the edge of forests, or springing up to give height to our hedgerows, it takes kindly to cultivation. Its great flat clusters of creamy blooms are followed by small plumlike fruits, first crimson, then deep purple, the two often intermingled, and all growing on red stems. Then, to choose another among the numerous species, one most adaptable in a variety of situations, even for growth in a city, is the blackhaw, *V. prunifolium.* Usually a shrub, the blackhaw occasionally becomes a rigid little tree. The leaves are glossy, and the white flowers are delightfully fragrant. But it is the fruit, long held on the tree, which invites the birds. The dark blue oval fruits seem most attractive to them after they have been softened and sweetened by a frost, so often hang on the boughs until spring and then are pounced upon eagerly by the early comers from the South.

But to leave the viburnums for the elderberries. East and west, north and south, grow the various species of Sambucus. How widespread is the family! Even in Australia, there is an elderberry, a favorite of the lyrebird. Here in America 118 species of birds are known to eat of their fruit. Of course, most commonly seen is the black elderberry, *Sambucus canadensis.* All through our byways its snowy blossoms foam over the stone walls or are outlined against the dark water in the little ponds. But for the birds there are never too many elderberries and there is no reason why we should not have more of them in cultivation. More and more as we pass the pioneer period in this country, do we appreciate the wealth of plant material that we have at our own doors. Plant masses of our native elderberry near the borders of your pool, let its luscious top-heavy clusters border the path as the ground becomes moist near your lake. Perhaps you won't have much fruit for jam or wine, but certainly you will have broadcast an invitation for the birds.

Other fruit-bearing trees and shrubs

Bayberry, *Myrica carolinensis*

Blueberry, highbush, *Vaccinium corymbosum*

Cherry, wild black, *Prunus serotina*

Chokeberry, red and black, *Aronia arbutifolia, A. melanocarpa*

Hawthorn, *Crataegus phaenopyrum, C. crus-galli*

Mulberry, *Morus rubra*

Shadbush and Juneberry, *Amelanchier canadensis, A. laevis*

Spicebush, *Benzoin aestivale*

Tupelo or pepperidge, *Nyssa sylvatica*

LET YOUR CAMERA HELP YOU REMEMBER

HAZEL R. ELLIS, KEUKA COLLEGE

Photographs by the Author

Why has man left so many ugly scars as witness of his presence here? This is the question that has persisted in recurring to me whenever I have come back from a primitive area, where nature is in harmonious balance, to live again with the human race. On the other hand, why does beauty reside in nature undisturbed by man and in a lovely garden that has been designed and managed by man, the artist?

J. Arthur Thomson has given us an answer that seems worthy of passing on: "In wild nature there is almost no disease or overaging. Just as nature is all for health, so nature is all for beauty, the reason being that wild plants and animals are harmonies that have stood the test of time and have had all the discords and incongruities — if they ever had any — sifted out of them."

As one observes the inroads made on our vanishing wild life, many of us feel the necessity to accumulate as many first-hand experiences as we can with what remains. In order to help preserve these experiences with accuracy and vividness, two methods are helpful. One is to take descriptive notes while on the spot and the other is to make an image record by drawings or camera.

The painter-artist, in his own way, interprets beauty of line, color and sense of motion. What a wealth of accumulated beauty in bird life has been left us by Audubon, Fuertes and Sutton! To those of us not endowed with such ability, there is open the other method, records by camera.

A bird student, sooner or later, feels the urge to join the army of amateur photographers and starts his own collec-

Cormorant Rookery, Old Hump Island, off the Maine Coast

Nest and Young of Cormorant, Old Hump Island

tion. In this way he snatches from time rare moments that can be relived as frequently as he reviews his pictures.

The perfectionist can find in bird photography ample opportunity and challenge to satisfy himself and always an audience to admire his accomplishments. To arrive at the top as a camera artist necessitates experience with cameras and knowledge of birds. But one does not start at the top and each will have his own set of standards. Some will prefer the birds in action, others will like them to seem at home and unaware of intrusion.

For those who are ready to begin an adventure in bird photography, a few hints may be helpful. You can have a lot of fun without an expensive camera. Perhaps the easiest way to photograph wild, free birds is to find birds with young in the nest. This is not difficult for the bird student. The colony of double-crested cormorants nesting on Old Hump island, off the coast of Maine, illustrates how easy it is to make photographs of sea birds in their nesting colonies. When I look at my photographs of these birds, I recall the day in early July when I visited the bird-

smothered island. The mass of seaweed that grew at the base of the rocks was slippery and had the smell of the sea. When this margin had been conquered without accident to camera or operator, the adult birds had flown from the rocks where they had been feeding young. To have made a picture of this process would have revealed the strange feeding habit of these birds. The young thrusts its head into the throat of the parent and extracts the partly digested food, which is largely fish. Some of the young were still covered with down and numbered three or four to a nest. The nests were constructed of seaweeds and sticks which must have been brought in from some distance.

In spite of the fact that it did not require much skill to make the cormorant pictures, they give an accurate notion of the characteristic pose and home life of the bird. They are evidence of the presence and abundance of this species at one time and place.

One does not need to go to an isolated habitat, inaccessible to man, to find birds to photograph. The Savannah sparrow that selected a perch at a convenient height in the open made a very easy subject for my kodak. While a blind erected a few feet from this perch would have given more detail, yet the dark line over the eye and the short tail serve to recall to me the soft, lisping *tsit-tsit-tsit-tseee-tseee,* which this bird had just repeated. His slight crest is raised to give evidence of his dreamy song.

Eastern Savanah Sparrow in Song

As success comes with efforts, new fields to conquer are sure to arise. Eventually one becomes an addict to the blind placed before a feeding tray or nest. There is a distinct advantage in using blinds. If the bird accepts the presence of the blind, one can watch its habits and make a selection of various poses as the bird goes about its daily life. The least bittern which I photographed 11 times in less than an hour taught me more than I would have learned without the seclusion offered by four stakes and a number of burlap bags. Standing in water above my knees, gambling with the sun and shadows that make lighting a problem, I learned that the bird took little notice of the human voice. Perhaps it could not hear it. At the same time, it was quickly alarmed by any disturbance of the water such as was made by dropping a cat-tail stem.

Down through the ages organic wisdom has been perpetuated as a response that man calls instinct. The enemies of marsh birds have so long given warning by the dripping or splashing of water that this bird reacted instantly to such sounds. So nicely has this bird been adapted to slip from nest and approach again, without seeming to move a leaf, that it vanished and appeared as by magic.

There is an advantage in developing bird photography as a hobby, aside from

Eastern Least Bittern at Nest

the scientific value in giving evidence and the pleasure it brings. It is a master-teacher in causing one to observe for oneself. There is value in reading of the observations of another, but the experiences that last are the real contact experiences which bring to us sense impressions from sight, hearing, sound, smell and touch. These experiences become vitally a part of one and furnish a body of facts that one finds no difficulty in remembering.

ACKNOWLEDGMENT

This Arbor Day and Bird Day number of the Bulletin to the Schools was compiled with the cooperation of the New York State Museum. The editor desires to express his appreciation to Dr Charles C. Adams, Director of the State Museum; to Dr Homer D. House, State Botanist; to Dr Dayton Stoner, State Zoologist; and to others who contributed articles and photographs.

THE COVER ILLUSTRATION

Howard H. Cleaves, of Prince Bay, Staten Island, New York, is one of the foremost photographers of wild life in this country. His adventures with the camera have taken place in many parts of the continent as well as on distant seas. At the International Exhibition of Nature Photography held in London not long ago he was granted a certificate of merit. Both still and motion pictures are included in Mr Cleaves' album of animal portraits and he has the ability to accompany the results of his photographic endeavors with pleasing portrayals on the lecture platform.

The subjects of the cover illustration are Mr Cleaves' young son and an immature screech owl.

CONSERVATION TALKS

Talks on forestry, often in dialog, are broadcast by the New York State College of Forestry at Syracuse University the first Monday of each month at 12.35 p. m. from Station WGY at Schenectady. These 11 or 12-minute broadcasts on the Farm Paper of the Air program deal with the importance of forest conservation. Many of the programs are of interest to children. The topics and speakers for the balance of the school year follow:

April 2d, "Shade Trees," Dr Laurie D. Cox

May 5th, "Pioneer Uses of Trees," Dr William M. Harlow

June 2d, "Lengthening the Life of Wood," Professor J. Oscar Blew

BIRD CASUALTIES ON THE HIGHWAYS

DAYTON STONER, STATE ZOOLOGIST, NEW YORK STATE MUSEUM

Fifteen years ago I published in one of the professional journals an article entitled "The Toll of the Automobile." The account dealt with a motor car trip of 632 miles which I made in Iowa during the summer of 1924 and on which 142 dead birds, 43 mammals and 40 reptiles were counted on the highways — casualties due to speeding automobiles.

So far as I know this was the first published formal account pertaining to this feature of wild life mortality. Since that time, however, numerous inventories and discussions of such casualties have appeared in print and, indeed, an entire book has been written on the subject.

Most of my subsequent records of wild life casualties on the highways have been made on cross-country journeys, four of them round trips between Albany, N. Y., and Iowa City, Iowa, in the late summers of 1935, 1937, 1938 and 1940. Approximately 28 driving days were required in traveling the 8576 miles, on which 2975 freshly killed vertebrate animals (amphibians, reptiles, birds and mammals) were counted lying on and immediately at the sides of the highway, the victims of motor cars. Five hundred fifty-three of the victims occurred on the 2644 miles of highway traveled in New York State.

So many factors are involved in a consideration of these casualties that detailed discussion of them can not be undertaken here. Suffice it to say that the time of year, temperature and precipitation, and ecological conditions bordering the highways concerned, as well as the locomotive ability, nocturnal proclivities and feeding habits of the victims, together with the type of highway and the number and speed of the automobiles traveling them, all have an important bearing upon the number and kind of animal casualties concerned. Without further reflection upon these and allied features, a concrete discussion of the birds actually encountered on the four trips mentioned and supplemented by other recent findings in New York State will serve to give some notion of the general situation attending this now important feature of animal destruction.

As might be expected, among these highway casualties, birds were better represented than any other vertebrate group, 25 species comprising 1312 individuals having been *positively* identified in passing; since their identity could not be established without stopping, 469 additional casualties were recorded as "miscellaneous undetermined birds." Thus a grand total of 1781 birds probably representing considerably more than 25 species is included in our counts on these four cross-country tours. New York, with 14 species recorded, led all the states in this respect.

Outstanding in this imposing list of bird fatalities are the two introduced forms, the English sparrow and the domestic fowl; together they comprise 1261 individuals or 70 per cent of the entire number. Of these, 1043 (82 per cent) were English sparrows. As a matter of fact, I believe that more than 75 per cent of the carcasses indicated as miscellaneous undetermined birds also were English sparrows. As might be expected, the mortality rate in this species was highest in agricultural communities; 228 carcasses were counted on 1030 miles of highway in the Province of Ontario, Canada, 78 on 479 miles in Iowa and 205

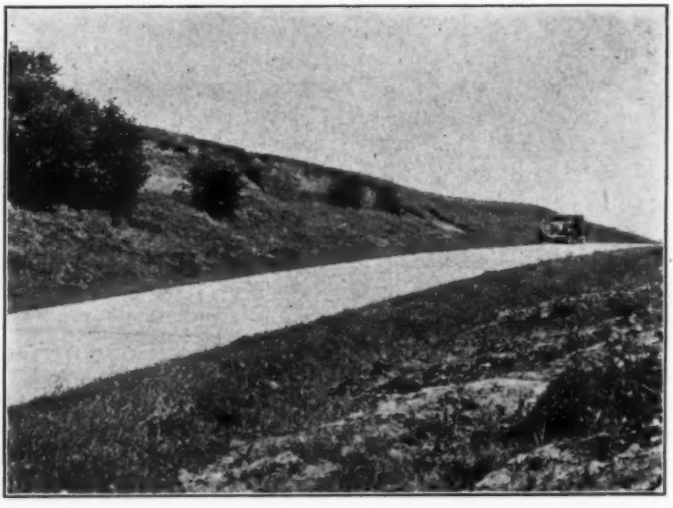
on 1445 miles in Illinois; only 160 were counted on 2644 miles in New York. Most of the casualties were among birds of the year. In the 1937 round trip of 2117 miles, 613 dead English sparrows were counted. Despite this apparently high mortality rate, however, and contrary to the wishful thinking of many observers, indications do not point to any appreciable reduction in the sparrow population during the past five years.

Casualties among domestic fowls likewise occurred most frequently in the central agricultural states; the highest average counts were made in Iowa with 26 carcasses on 479 miles and Illinois with 76 carcasses on 1445 miles.

Another introduced form, the ring-necked pheasant, frequently meets death on the highway. Seven individuals, all females, were counted on the four trips; three of these were in New York State, with one each in Illinois, Indiana, Michigan and Ohio. When the potential reproductive possibilities of these casualties is considered the loss thus sustained has important economic bearings, particularly in view of the likelihood that at least some of these were hand-reared birds released for local stocking purposes.

Among our *native* birds, the robin was recorded the greatest number of times, 12 in all, for the trips cited. Not only does this species of the thrush family (Turdidae) frequently meet disaster on the highway but also its close relatives, the wood thrush and the bluebird, frequently suffer a similar fate. Contributing factors to such an end are their more or less terrestrial habits, their undeveloped lack of wariness and precaution, their comparatively slow flight speed and their lack of ability to "time" their getaway before an oncoming car.

The swallows are ordinarily classed as good or excellent flyers; their flight speed ordinarily ranges from 20 to 30 miles an hour. In addition, they are capable



Photograph by Dayton Stoner

Birds Are Often Struck by Motor Cars on Bush-lined Paved Highways

of performing with unusual facility such remarkable aerial antics as diving, darting and zig zagging. One would think that few birds endowed with this proficiency would be struck by motor cars, but the records here cited indicate five casualties distributed among three species. In the course of other travels I have frequently noted not only dead barn, cliff and tree swallows on the highway but bank swallows as well.

I believe that these birds often meet death by reason of their sheer ability on the wing which renders them more likely to take chances before an oncoming car rather than to attempt evading it in frightened desperation.

Another group of birds well represented in this list and in other highway casualty lists is that containing the woodpeckers (Picidae). As a matter of fact it was the extraordinary preponderance of the red-headed woodpecker as a highway casualty that prompted me first to announce my findings in 1925. Of the 142 dead birds then recorded on 632 miles of Iowa highway, woodpeckers of four species comprised 75 of the casualties; 53 of these were red-headed woodpeckers. For the four round-trip records here reported, nine woodpecker casualties were noted; one of these was a red-headed woodpecker (Illinois) while five were flickers, one each for Illinois, Indiana, Iowa, Michigan and Ohio. Two yellow-bellied sapsuckers and a downy woodpecker complete the list.

Other bird casualties met with on the cross-country trips discussed here include the peafowl, Virginia rail, screech owl, brown thrasher, meadow lark and bronzed grackle. Additional species recorded from New York State include the barred owl, kingbird, catbird, chestnut-sided warbler and goldfinch. And, since the beginning of my interest in this phase of animal mortality, I have recorded in various parts of the country such other avian highway casualties as the sparrow hawk, crow, mockingbird, cedar waxwing, starling, Baltimore oriole and towhee.

It will be observed from the above that scarcely any group of birds is immune from destruction by the motor car on our highways. Probably little can be done by man to reduce this slaughter except to reduce his own rate of speed.

At least some of these highway casualties can be utilized in the furtherance of human knowledge. Therefore, the closing paragraphs of this article may well be devoted to that feature.

In the first place, observations on avian or other animal casualties on the highway, if conducted for extended periods over extensive or even restricted areas, provide within limitations, some notion of the kinds of animals inhabiting the region. In addition, they often throw light upon the relative proportions of certain species and their habits, reactions and maintenance of numbers in relation to this menace which recently has become a part of the survivors' experience. Incidentally, it may be mentioned that the perils of the motor car also should be taken into account in providing breeding areas for species of economic importance.

In the second place, the bodies of not too badly mutilated birds and other animals lying on the highways may well be recovered by motorists and donated to some institution for concrete evidence of occurrence and the preservation of such other natural history data as may be provided therefrom. Valuable information such as seasonal or other variation in

plumage, food habits, breeding status and the like often may be obtained through detailed examination of these carcasses.

Within the past few years the New York State Museum has acquired for its zoological study collections a considerable number of birds and mammals killed on the highways. This and other educational institutions welcome such material and I shall be glad to receive it for the Museum. At the expenditure of a small amount of time and effort almost everyone may render an aid to science by recovering for a useful purpose specimens of the larger animals sacrificed on the altar of speed.

HOMING INSTINCT OF THE RED-WINGED BLACKBIRD

REGINALD D. MANWELL, DEPARTMENT OF ZOOLOGY, SYRACUSE UNIVERSITY

Who has not had the experience of getting lost? And who has not wished that he might have the opportunity to travel anywhere, whenever he wished and without cost, and without worry as to how he might get back? Probably no mere man has ever been able to do this, but some birds approach it, and the familiar red-wing is one of these. It is likely that most birds possess in varying degree this remarkable ability of finding their way back from unfamiliar places. It is common knowledge that other kinds of animals also are often able to find their way back from strange localities without previous experience, but the "homing instinct," as it is generally called, is more common and more highly developed among birds than in any other large group.

That birds possess this ability has been known for at least 2500 years. Men observed in ancient times that birds disappeared, often rather suddenly, with the advent of cold weather, and that they returned in the spring. They also knew that in some species the dates of departure and return varied little from year to year. It is true that no one knew where they went, and there were many wonderful tales about it. In those days, and for a long time afterward, no one thought of catching and banding birds with numbered tags as we do today, and until this was done nothing very definite could be learned. Indeed most of what we now know about the migratory and homing habits of birds is the direct result of the application of this method of study

Photograph by Guy Bailey
Courtesy Bureau of Radio and Visual Aids

Male Red-winged Blackbird

on a large scale. It is only within the past 30 years that this technic has been employed.

Since 1920 the United States Government, through the former Biological Survey, has made itself responsible for the granting of permits and the distribution of the numbered bands to those interested in this sort of work. It also keeps the records and tabulates the reports of those who find banded birds. It is important that anyone finding such birds, whether dead or alive, should send the number (or the band, if the bird is dead) to the Bureau of Biological Survey (now the Fish and Wildlife Service) at Washington.

Although the homing instinct and the migratory instinct are really different expressions of what is almost the same thing, it is essential to distinguish between the two. The ability to find its way back to a given place, as for example the place of nesting, is due to what we call the homing instinct, but the habit of migration involves this and more. It is a seasonal matter, depending on temperature, weather and food supply. In the former case the birds travel alone, but in the latter they usually go in flocks. Homing involves the location of a precise spot, whereas migration requires only the finding of a general locality.

The red-winged blackbird, which zoologists with their inconvenient habit of picking difficult names call *Agelaius phoeniceus phoeniceus,* is almost as familiar to most people as is the robin or the English sparrow. It delights in spending its time around ponds and boggy places. The males are a brilliant black with a patch of bright orange-red at the base of each wing. The females dress a little more soberly, and return from the South a little later in the spring. Either because they are a little more canny or because they may prefer a somewhat different diet, they are less easy to trap than the males, so nearly all the experiments described in this paper have been with the males.

The traps used are of square mesh wire, and consist essentially of funnels leading into a central chamber in which a mixture of various seeds has been placed as bait. The mixture is also placed in the funnels themselves, and the birds soon learn that there is always a meal there. Apparently they are so busy eating that they walk through the funnel into the central portion of the trap without realizing it, and then are too confused to find their way out.

Once the birds are caught they are banded and the number of each is recorded on a card, together with the date and any other interesting information, such as the sex, probable age, presence of any disease (such as malaria, which is common in birds), and the date of previous capture, if the bird has been caught before. When there are enough birds to make it worth while they are put into a covered container and taken to the place of release. In many cases they have been liberated at night, and whenever possible near bodies of water, since they prefer such regions for nesting.

As the result of such experiments it has been found that red-wings are similar to homing pigeons in their ability to find their way back from strange places. They have been recaught at Syracuse after release from points as far away as Buffalo and Watertown, N. Y., Scranton, Pa., and Hadley, Mass. Apparently it makes no difference whether they are liberated at night or in the daytime, nor

at what point of the compass with respect to Syracuse they are released. But it does appear that some birds are much better able to find their way back than others, for in no case have all the liberated birds been recaught, and certain birds are repeatedly caught — sometimes eight or ten times in the course of the spring. Sometimes too they are not recaught until the following year. Their speed of return is not very great, and so far the record for speed is held by a blackbird released at Schenectady. It required 12 days to come back, thus averaging 10 miles a day. Of course there is no way of knowing whether it was recaught as soon as it returned.

Another interesting fact is that the birds are not deterred from returning by the attractiveness of other areas. The Montezuma swamp, for example, would appear to be an ideal spot for birds having the tastes of the red-wing, but although a number of birds were released there, as many of them found their way back to the place of original capture in Syracuse as from any other point of release. This was true also of red-wings liberated at Oneida lake and Cayuga lake and near other bodies of water.

A question which may be asked at this point concerns the reason why a bird regards a given place as "home." To this no definite answer as yet can be given. In some cases it is probably because the bird was raised as a nestling there, and in others it is because it has a nest in that particular spot. It is certainly true, however, that not all birds return to the place where they were originally raised, although many of them probably come back to the general locality. And it is very certain that different species have quite different habits so far as this is concerned.

The explanation of the "sixth sense" which enables birds to find their way back from unfamiliar places is still quite unknown. It is certainly not due to a memory of landmarks or familiar objects, such as hills, forests or houses, nor is it a matter of following the lines of the earth's magnetism. Ability to fly a direction determined by prevailing winds in a given region, or to strike a course bearing some definite relationship to the sun or stars is also very unlikely. Experiments have been carried out to determine whether anesthesia during travel to a point of release, or exposure to a powerful magnetic field, in any way influenced the proportion of returns, and no effect has been found. Certain water birds, such as terns and petrels, have been taken on boats to points many hundreds of miles from the place of capture, and when released many of them have been able to find their way back. Experiments such as these show that the operation of the homing instinct can not in any way (at least in birds of these species) depend on the perception of landmarks, since there were none over the course they followed. Such must also be the case with the blackbirds which we have been describing, for the points of release were, at least in many cases, not only far from Syracuse but far from their migration routes.

So we may well envy birds their ability to find their way in unfamiliar country, and for those of us who have much curiosity and want to discover for ourselves new facts, there is much opportunity in the study of this remarkable instinct which most birds possess, and which is shared by many other animals.

A BIRD SANCTUARY

CLARENCE M. BEAL, JAMESTOWN

Photographs by the Author

The requirements of a good bird sanctuary are many. The area should have an unusual supply of birds, plenty of natural food, a supply of feeding station food to attract the birds and to keep them during adverse weather, protection from hunting and some protection from predators.

Many areas are naturally poor for birds and no amount of effort would make them desirable. In choosing a sanctuary a variety of plant cover types, from grass to shrub and tree, is essential for a variety of birds. A marsh and lake, open field, brushland, orchard, swampy woodland, open woodland, dense woodland, each has birds not found in the others.

Some sanctuaries are that in name only; a few signs will not attract birds. A good chain-link mesh fence will keep out foxes, cats, dogs and other animals if the wire is deeply buried, the mesh is very small and the fence is high. Otherwise the fence is merely a boundary marker. Posting the area to prevent hunting is necessary if you have game birds or waterfowl. Patrolling may be necessary to keep out hunters.

Predators are not all villains. But foxes, cats, rats, dogs and weasels will take birds if they can get them. A tolerant attitude is best toward such borderline creatures as screech owls, squirrels, crows, hawks, grackles and jays, unless they prove definitely destructive.

The size of a sanctuary varies according to the birds desired. A sandhill crane needs a marsh a mile wide, a house wren will nest in your backyard. Some authorities favor large sanctuaries, but I do not think that size is as important as quality. There is no reason for having a 500-acre sanctuary if two-thirds of the birds are on 20 acres.

The Kellogg Bird Sanctuary, near Battle Creek, Mich., is one of the most successful sanctuaries in the country. Under Dr Miles D. Pirnie it has become a haven for 3000 Canada geese and 10,000 wild ducks during the fall season. A few wing-clipped birds as decoys have attracted wild birds in increasing numbers each year. A plentiful supply of cracked corn and wheat, added to the natural water plants of the lake, keeps the waterfowl contented.

The Kellogg Sanctuary was started in 1927, inspired by Jack Miner's famous goose refuge at Kingsville, Ontario. It is about 100 acres in area, including a 25-acre lake. The educational value is shown by the yearly attendance of 100,000 persons. There is no admission charge, but visitors are necessarily

Screech Owls Are Not Often Seen. This One Laid Her First Egg on April 10th

restricted to such areas as the lake front feeding area, the museum, the aquarium, the aviaries and a few public paths. Formerly operated by W. K. Kellogg of breakfast-food fame, the sanctuary was given by him to the state of Michigan.

Predators are not a serious problem at the sanctuary, the fence keeping out terrestrial animals, while hawks and owls pay little attention to the abundant bird life.

Feeding stations are operated at all seasons, to attract birds and to keep them accustomed to a regular source of food. Cracked corn, wheat, sunflower seeds, millet and suet cakes are available. Jays, cardinals, woodpeckers, nuthatches, chickadees, titmice, redwings, sparrows and fox squirrels are among the patrons.

Doctor Pirnie, who is author of Michigan Waterfowl Management, is constantly adding to his exceptional knowledge of waterfowl habits, plumage, migration, nesting and food preferences. He has also amassed a beautiful collection of photographs, many in color. As director of the sanctuary he has an opportunity to experiment and learn by experience from year to year.

The Black Duck Nests in Remote Swales

Tree Swallows Prefer Houses Near Swamps

I spent six months at the Kellogg Bird Sanctuary in 1940 as an assistant, finding it an excellent place to study birds. I learned that flickers and tree swallows which occupy birdhouses one year may be absent the next; that birdhouses four feet from the ground are seldom occupied (unless they are large enough for wood ducks); that destruction of house sparrow nests is futile, and that they continue to renest until shooting is necessary; that waterfowl do not "stay put," but fly outside the sanctuary in all directions, many to distant states.

I also learned that a sanctuary may improve the hunting in surrounding country, rather than otherwise; that hawks and owls are not converging on the area, but are of much less trouble than would be imagined; that red pines are preferred nesting sites to such evergreens as white pine, Scotch pine, jack

A Mallard Brooding Her Young

pine and Norway spruce; that Canada geese prefer to nest on small islands, and that this goose now nests in many southern Michigan areas, the birds being offspring of pinioned sanctuary birds released since 1928.

It was at the sanctuary I found that young mallards after the first day or two spend most of their time following their mother through the fields, not in the water. And while mallards will nest near houses, the black duck requires privacy on remote swales. Geese begin egg laying during the second week of April, and mallards during the third, while the great majority of their species are still migrating. And the eggs which they lay will resist moderate freezing temperatures until after incubation begins.

The great value of a sanctuary, however, is not in protecting birds, not in providing a place to study birds, but in interesting the public in bird life.

A GAME BIRD DAY

E. LAURENCE PALMER, CORNELL UNIVERSITY

For years the emphasis on Bird Days the country over has centered on the smaller, more conspicuously colored song birds of the trees and fields. With justice, their rights to live and their claims for protection have been recognized by extensive legislation, by expensive publications, by the radio, the movies and by most of the effective methods of public education. For the most part, the interests of the game birds and shore birds have been left to the sportsmen, many of whom have an abundance of cash and of influence. These men have often seen the problems of game birds on the basis of wild animal husbandry and for the most part recognize that the essential function of these birds to man lies in the direction of producing gun fodder.

It might be both refreshing and profitable for various school groups to devote one Bird Day or at least a part of each Bird Day to consideration of the general role filled by game birds and by shore birds. Are they on the increase or decrease? What factors are influencing their abundance? Are they valuable only as targets? What can be done to improve their usefulness?

More than half a million persons purchased licenses for taking fish and game in New York State in 1939. It is known that 71 per cent of these took at least one

piece of fish or game. It is obvious that if the interests of these people are to be recognized conditions must be maintained which are suitable to the survival of the creatures they seek.

The table below gives some clue to the varying abundance of the more important game birds and shore birds of the State and of the species of fur-bearers commonly reputed to have an influence as so-called " vermin " on the abundance of some of the birds. These figures are from the reports of the State Conservation Department and represent the " takes " reported by those applying for new licenses. The numbers are undoubtedly below the actual take. They do not include the birds which died after being wounded by the hunters. Neither do they include birds taken legally by landowners who may not be required to have a license. They do, however, reflect reliably the variation in abundance during the years.

Take of game birds, waterfowl and associated fur-bearers in New York State

	1921	1924	1928	1931	1936	1937	1938
Ducks	180 721	148 771	109 695	55 242	51 439	79 980	100 000+
Geese	3 276	2 149	3 221	660	666	814	" nearly 600 "
Woodcocks	23 870	17 828	10 892	17 834	15 544	27 639	28 402
Snipes	9 847	4 444	1 326	1 571	510	972	
Shore birds (misc.)	[a]22 443	11 703	2 902	3 568	1 046	1 380	
Shore birds now legal	8 161	3 729	2 870	3 568	1 046	1 380	
Pheasants	77 381	130 143	167 962	193 455	210 062	228 648	277 903
Grouse	104 865	94 797	?	40 448	80 282	94 056	140 851
Quails	6 078	4 800	8 618	12 320	3 112	5 146	
Red foxes	12 410	14 213	10 616	8 118	10 593	15 550	about 15 000
Gray foxes	2 576	2 532	2 269	2 806	4 247	4 980	5 515
Skunks	[b]192 348	97 885	72 623	?	42 669	36 701	about 34 000

[a] The placing of plover and yellowlegs on the protected list affects the take of these birds.
[b] In 1919 there were 213,000 skunks taken in New York State.

A few things are worth noting in this table. While more than 100,000 ducks are reported as having been taken in 1938, the newspaper accounts that the ducks " have recovered from the slump " is far from true when the 1938 take is compared with the 1921 take. While the papers boast that " nearly 600 geese were killed . . . in 1935 " this figure is really lower than any other take reported in the table. While it is true that the takes of pheasants and of grouse and wood-

cocks represent new highs, this is surely not so of the snipes, the shore birds and of quails; and the take of pheasants is necessarily influenced by the number of birds reared in pens and freed.

Some of the hunters tell us that the undesirable trends in the abundance of game are due to the abundance of foxes and skunks while the desirable trends are due to the hunters. In this connection it is worth noticing that the greater the number of gray foxes the greater is the number of grouse taken. This is true at least of red foxes in other states where the best fox hunting is over the same lands which provide the best quail hunting. There seems to be little justice in the claim of the hunters that these creatures must be wiped out if we are to have game for their guns. W. J. Hamilton jr, of Cornell University, who has long studied foxes, is one of the best defenders of foxes as desirable members of farm communities. He tells us that game forms a " very small portion " of the fox fare but that pests such as mice, chipmunks and insects with fruits and berries are important in the diet.

The skunk population appears to have been depleted to an alarming degree when it is noted that the take of this important fur-bearer dropped from 213,000 in 1919 to 34,000 in 1938. We are told that we may expect a further drop but nothing seems to be likely to be done to protect this animal so important as a fur-bearer to the farm boy and even more important as an insect destroyer to farmers. In its present abundance, it can not be considered important in influencing the numbers of game birds. It is interesting to note that the raw-fur interests are making some move to get protection for foxes in the State, but that is another story. Obviously it is difficult to interpret these trends in the take of fur-bearers and of the more important game and shore birds.

With new developments designed to increase the breeding and resting areas for waterfowl in the State; with splendid progress in learning how possibly to raise grouse in captivity; with conflicting interests involving sportsmen, trappers, bird lovers, crop raisers and wild life specialists all centering around the abundance of game birds and shore birds, it seems entirely appropriate that their problems be considered in any Bird Day celebration.

The Cornell Rural School Leaflets for November 1939 and January and March 1940 were produced with the cooperation of the State Conservation Department and deal in a popular way with some of these problems. They are still available in limited quantities for school use.

CHAIN OF EVENTS

WILLIAM H. CARR, BEAR MOUNTAIN TRAILSIDE MUSEUM, PALISADES INTERSTATE PARK

Toward the end of every winter, naturalists who live near Bear Mountain, N. Y., witness an unusual form of community life among birds on the broad, icy expanse of the Hudson river. First and foremost among the river dwellers are the eagles, white-headed master gliders above the ice floes. Next in order of prominence and second to none in importance, are the herring and ring-billed gulls. Crows follow in more ways than one, and black and mallard ducks, together with American mergansers, round out the principal residents of this highly restricted colony.

The birds spend a great deal of their time either upon the mile-wide moving ice field or in frigid waters, as currents move back and forth, motivated by distant Atlantic tides. Ducks exhibit the greatest degree of independence and, based on human standards, lead a seemingly unexciting and highly uncomfortable existence, diving for fish or submerging their water-repellent bodies in shallow places, seeking plant and crustacean food. When buffeted by winds or pressed by swift water, they climb awkwardly upon some drifting ice cake and rest like so many bundles of dark feathers upon a huge bluish-white bed.

The gulls are exceedingly active members of the clan and frequently work for hours in their ceaseless effort to overpower some unwary tomcod. Often the gray birds, after hours of patient search and ultimate conquest, are unable to reap the benefit of their uncertain fish harvest. Far up on the mountains, marking the southern boundary of the Hudson highlands, sits a robber baron on watch for an opportunity to garner a meal at the expense of some luckless gull. Keen eyes, ever alert, discover the moving gulls as they gather upon the distant ice to squabble and battle over a fish that one of their kind has been fortunate enough to secure.

As contestants grow increasingly vehement in their attempts to snatch the fish and escape with it, the mountain watcher takes wing, gains momentum and appears upon the battlefield with startling swiftness. A moment before his arrival, the gulls, with raucous protest, fly off in all directions. The individual possessing the fish remains until the last second, then darts off precipitously to join his outraged fellows.

Forward sails the eagle, imperturbably, body under perfect control, talons ready. With the ultimate in precision and ease he reaches down, secures the forfeited fish in a powerful grip and continues his effortless glide. After a journey of perhaps a quarter of a mile he will come to rest upon an ice floe and proceed to tear the fish to shreds.

At this juncture a third group of actors enters the scene. Down from near-by hills drift several ebon shadows, opportunist crows en route to the scene of the eagle's feast. They alight not far off and set up a great to-do, cawing and bobbing about in excitement, waiting for the eagle to finish his deliberate meal. The white-headed bird, with total disregard for the impatient would-be scavengers, pauses frequently to gaze over the river and, when completely satisfied

that all is well, returns to the task in hand. After a time, when the crows have at last become silent, the eagle, taking his own good time, soars away without so much as a backward glance.

In an instant the crows dash to the vacated spot and greedily devour the pitifully few morsels remaining. Thus the cycle is completed, from tomcod to crow. Far off downstream the eagle rapidly becomes a pin point on the horizon. Gulls continue to search for fish, ducks rest quietly in the water and life goes on as usual.

THE NATURALIST'S NOTEBOOK

J. KENNETH TERRES, SOIL CONSERVATION SERVICE, BURDETT, N. Y.

The use of a notebook to record field observations has long been advocated by eminent naturalists, but unfortunately this advice has often gone unheeded by aspiring young ornithologists and nature-lovers. How I wish now that I had a carefully penned account of the wild life met with on boyish adventures in marshes and woodlands of southern New Jersey, when I lived only for the long summer days with the birds and the early winter mornings on the trap-line. Even though written as a youth, a lucid, daily record of the weather; arrival, departure and general activities of birds; the flowering and fruiting periods of common plants, and many other wild life observations can be of value to the budding ornithologist, or to other naturalists who come later to work in his region. If one is fortunate enough to grow to manhood in the area that first saw his wide-eyed curiosity in the color and voices of birds, then indeed will his daily journal become more fruitful with the passing years.

Since our memories play us tricks, an observation, no matter how simple, when committed to the notebook becomes an indelible impression, outliving the illusions wrought by time. One day an elderly farmer near Ithaca, N. Y., was recalling the bird life that occurred on his farm more than 50 years ago. I think he expressed the illusory effect of time rather quaintly, but accurately, when he concluded his account with a smile and the comment that, "Distance lends enchantment."

Opinions will vary as to the type of notebook to be used for field work and the method of recording observations. I believe that these differences of opinion are of little importance so long as the individual keeps *consistent* records with a positive regard for neatness and legibility. For a number of years I have relied upon small pocket-size "field books" ordinarily used for note-keeping by civil engineers. They are obtainable from manufacturers of drawing instruments and engineering equipment. Check lists of birds are now available for many local areas where the bird life has been much studied, but these seldom allow sufficient space for fully written observations.

I find that in my notebooks, the date, weather and locality heading can be followed conveniently with a full and chronological account of the day's obser-

vations. Notes are written *on the spot* so that my impressions of the weather, vegetation, time of day, and particularly the activity of the animal seen, are faithfully committed to paper *at the time they occurred*. In the evening, the day's field experiences are often rewritten in a large journal with even greater care for their organization and grammatical correctness. When a field book is completely filled with notes, it is promptly indexed so that references to the contents can be made with comparative ease. Thus I have gathered a rather complete record of daily observations on birds, plants and other kinds of wild life in one region for the past eight years.

This is, indeed, a modest accomplishment, fading to insignificance when compared with 25 to 50 years of careful note-keeping by many distinguished American naturalists. I am not dismayed, however; rather, these long records of faithful reports should be an inspiration to those of us who may have slighted this very important task.

The young naturalist should not anticipate that his note-keeping will be an onerous job. Once he has acquired the habit, a day afield will be considered incomplete without the descriptive and supporting notes that lend color and accuracy to the events of the day. He will find that his journal can capture the full glory of a morning in May: the songs and color of migrating warblers, the screaming activities of mated hawks, the blooming pageant of wild flowers, or the freshness of newly grown leaves in the awakening woodlands. From day to day the journal will set down new bird arrivals that he comes to associate with the blooming and leafing of certain flowering plants. Accurate and faithful note-keeping may soon become a most fascinating part of the day's work. From the journal we may recapture an experience at will; relive a day that may otherwise be forgotten with the new adventures of tomorrow.

I think that Gilbert White, the English naturalist, and the Americans, William Brewster, Elliot Coues, John Burroughs and Witmer Stone, first impressed me with the importance of daily notes, perhaps through my early familiarity with their high regard for the written record, and the fact that I was fortunate in knowing Doctor Stone personally.

Dr Elliot Coues in his chapter on Field Ornithology (Keys to North American Birds, p. 21–23) writes feelingly on the subject of daily records, of which I quote in part:

> You have collected items (about birds) of haunts and habits, abundance or scarcity . . . of pairing, nesting, feeding, migrating . . . Various notes of birds are still ringing in your ears. . . . Now *you* know these things and very likely no one else does; and you know them *at the time*, but you will not recollect a tithe of them in a few weeks or months, to say nothing of years. Don't trust your memory. . . What is clear now will grow obscure; what is found will be lost. Write down everything while it is fresh in your mind, write it out in full. . . Don't be satisfied with a dry-as-dust item; clothe a skeleton fact, and breathe life into it with thoughts that glow; let the paper smell of the woods. . ."

Thus spoke one of the most brilliant ornithologists and scientific writers in the history of American ornithology. Doctor Coues' advice was followed by many of his successful contemporaries and young admirers. The rich store of facts that can be gathered by daily note-keeping should inspire young naturalists to adopt this essential habit.

FOOD OF OWLS

WALTER THURBER AND R. E. BOWERS, CORTLAND STATE NORMAL SCHOOL

Photographs by the Authors

It may be that meals are not easily met with in the owl world. Whether or no, the eating habits of owls are economy itself. Instead of daintily skinning their prey and picking the meat from the bones, owls swallow as much of their prey as possible, fur, feathers, bones, claws and all.

Once in the stomach, strong digestive fluids act upon the food, dissolving flesh, skin, marrow, even the oil from the hair and the grease from the bones. When nothing but indigestible material remains, the stomach muscles squeeze out the nourishing fluid and leave a nearly dry mass.

Great Horned Owl

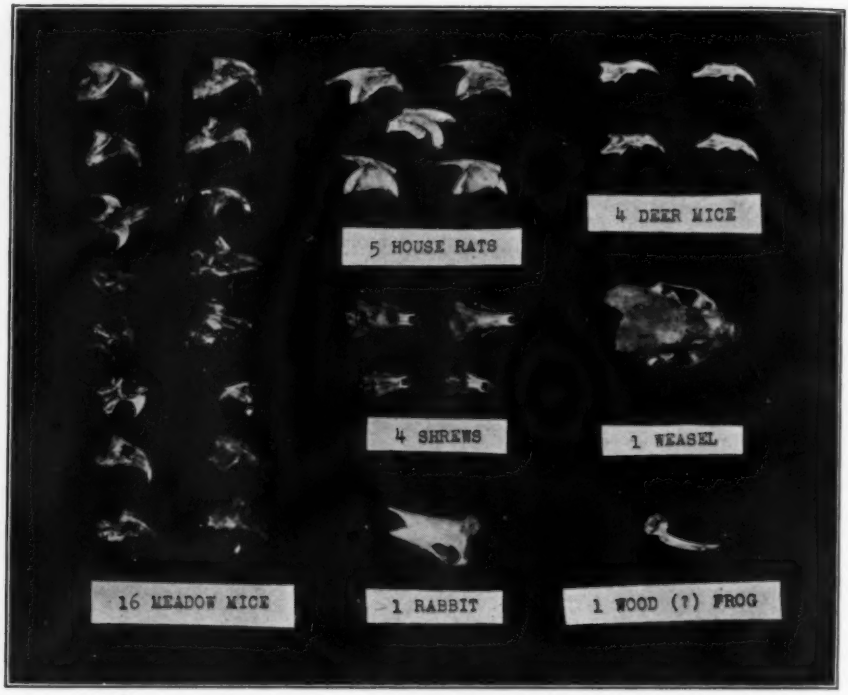
Perhaps because the addition of each ounce of weight is a big factor in flight, one more bit of economy is practised. The indigestible portion does not pass on through, clogging the alimentary canal and adding useless weight for the owl to carry around. Instead, the indigestible material is passed back up the throat and out the mouth.

These pellets of hair, bones and feathers may be found frequently in woods, particularly beneath evergreen trees. Owls prefer some sort of shelter during their daylight resting periods, and evergreen trees are quite satisfactory, especially for the larger owls. The pellets may also be found in belfries and similar shelters.

One need not feel squeamish about handling the pellets. Certainly little that is unpleasant could survive the acids of the owl's stomach. The digestible materials are completely gone; the bones, hair and feathers are cleaned almost as well as could be done in a laboratory. There is little odor when wet and none at all when dry.

One of the more noticeable things about these pellets is their compactness. The stomach muscles must be powerful indeed to compress the materials so firmly. Even the hollow bones and the brain cavities are so packed with hair that tweezers are needed to extract it.

Because the pellets give a clue to the food of owls, they make interesting study. In the accompanying photograph are shown a few of the bones taken from 50 such pellets, found on the snow beneath a single pine tree in Sapsucker



Examples of Animal Remains Found in the Pellets of Great Horned Owls Near Ithaca. Analysis of Fifty Pellets Provided Evidence of the Kinds and Number of Animals Eaten by These Large Predatory Birds.

woods at Ithaca, N. Y. Near-by a pair of horned owls were nesting. It is assumed that these pellets represent the food of the owls during their late-winter nesting season.

One should not presume that the contents of the pellets shown in the figure are typical of all horned owls, for owls in other situations might have a different diet. In fact, it may be noticed that there are no remains of small birds in the pellets, although horned owls are known to feed upon birds. As for the larger bones, it is assumed that these are from rabbits, although identification is not certain.

Large owls can capture full-grown rabbits and the horned owls have been known to attack skunks successfully. In Sapsucker woods, about the time the pellets were found, the tracks of a skunk were followed through the soft snow. In a small clearing the clean-cut trail suddenly became a confusion and the brush of wingtips could be seen on either side. When the trail was resumed, an occasional drop of blood showed that the skunk, though safe, was not unharmed.

It is interesting, and worth while too, to try to identify some of the remains of the pellets of owls. Although only an expert could make a complete analysis,

an amateur can sort out some of the remains.

The skulls, and particularly the teeth, are the best clues for the identification of the small mammals. Two groups, the ones most frequently met with, can be separated on this basis. The mouse group has chisel-like incisors and no canines; the shrew group has both canines and incisors, but the teeth are not highly specialized.

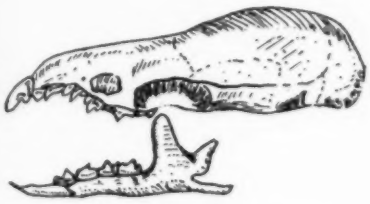


Figure 1 Skull of Shrew

Of the latter group, the shrews are caught more commonly than are the moles. If the teeth are brown-tipped, we may be certain that the owl fed upon Blarina, the short-tailed shrew.

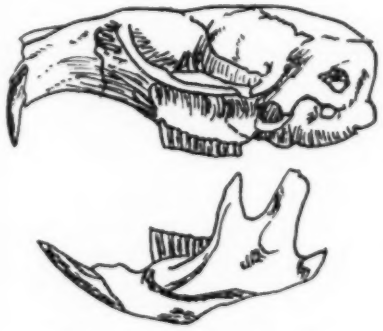


Figure 2 Skull of Mouse

There are so many representatives of the mouse group that positive identification would be difficult for the beginner. Two species, however, both important to man, the European mouse and the European brown rat, may be identified with certainty. The upper molars of these species are enamel-covered and tuberculate and the tubercles are arranged in three rows. See figure 3. The rat skulls are, of course, larger than the mouse skulls.

Several species of native mice have two rows of tubercles on their upper molars. The most numerous of these are the deer mice, pretty, brown and white animals with enormous eyes and ears and long tails.

Some of the molars discovered may be flat-crowned and made up of zigzag folds of enamel and dentine. These are probably from meadow mice, common and often injurious rodents.

Figure 3 Upper Molars of (a) Brown Rat, (b) Deer Mouse, (c) Meadow Mouse

The analyses that have been carried out on owl pellets have strengthened the impression of biologists that owls are economically valuable. True it is that some species of owls prey upon birds, but before man arrived on the scene, owls and songbirds were able to exist successfully side by side. We might better be interested in removing some of the introduced, rather than the natural hazards of bird life.

ARE BIRDS THE DOCTORS' HELPERS?

DR GORDON M. MEADE, STRONG MEMORIAL HOSPITAL, ROCHESTER

Scientists who study fossils, mummies and ancient writings tell us that men and animals have suffered from disease for thousands of years. Both the cave man and the cave bear that he drove from its den ached with rheumatism.

To primitive men the causes of their ills were terrifying and mysterious. It seemed that some god was punishing them, or that evil spirits had entered or cast a spell upon their bodies. In order to please the god or drive out the evil spirits and thus cure themselves they did strange things. They used charms, made sacrifices, drank nauseating potions and did other things which today seem rather silly and much like the hocus-pocus of magicians. But it was from such magical practices that medicine slowly grew.

In their charms, sacrifices and potions they used animals, plants and birds. Birds seemed to have mysterious powers because of their ability to disappear in the fall and reappear in the spring. Some were even thought to be evil spirits or witches.

Let us see some of the ways in which birds have been used by men to fight their old enemy, disease, both in ancient and modern times.

A most curious belief existed among many peoples that disease could be transferred to a bird. The Romans believed it possible to transfer their stomach-aches to a duck; the natives of the Carpathian mountains tried to give their freckles to spring's first swallow by uttering certain magic words; the Hottentots and the countryfolk of Devonshire, England, were sure that the poison of snake bites would pass into a chicken placed on the bite; Welshmen felt that by walking around a well while carrying a chicken and praying their epilepsy would be given to the fowl.

Charms to bring good luck are familiar to everyone. Birds were often used as charms to prevent ill health. In seventeenth century England carrying the bones of a linnet was believed to insure good health. German peasants thought that they would have no backaches if they rolled on the grass when they first heard a cuckoo in the spring. The feeling that some birds were witches and could work charms led to a very strange legend. It was said that if these birds used human hair in their nests the owner of the hair would become crazy, have headaches or become bald. People who believed this were careful never to throw away any hair where a bird could possibly find it.

Chief among the birds used as sacrifices was the rooster. He was sacrificed for thousands of years — at temples in times of epidemics, at the bed of a person ill with fever, buried under the bed of a person sick with epilepsy, and so on.

Those of you who have read the poem Evangeline may have wondered about the meaning of these lines.

> Seeking with eager eyes that wondrous stone which the swallow
> Brings from the shore of the sea to restore the sight of the fledgelings.

Longfellow was referring to an old Brittany belief that swallows could find a certain pebble which when placed on the unopened eyes of their young would give them sight and in similar fashion would restore vision to blind human eyes. The swallow was also said to have stones in its stomach which would make mad men sane when tied on their arms.

Parts of birds have been used for centuries in making medicines, salves etc. The Celts ground up a raven, smeared it on their bald heads, and then waited patiently for the hair to grow. A child with whooping cough or a drunkard were fed owl eggs in England and stork eggs in Spain to cure them. The feathers of owls and eagles were an important part of the medicine bags of the American Indian medicine men. From ancient Egyptian and Chinese times down to not so long ago goose grease was frequently used as a salve. Curiously enough the studies of modern pharmacists show that goose grease is one of the best for such purposes.

You and I know that these curious ways of curing the sick were wholly useless and you may ask, " Have birds been of any real help to men in fighting their old foes, disease and death? " The answer is yes — as soon as men began to study life and disease scientifically.

In the third century B. C. a man named Erasistratus used chickens in experiments to determine how much energy was necessary to keep animals alive. He thus began the study of what doctors today call metabolism.

Long ago men recognized birds as their allies in guarding the public health. Laws were passed in fifteenth century England protecting kites, ravens, rooks and jackdaws because they helped prevent the spread of disease by eating dead animals, garbage and refuse. Today in our Southern States vultures help in the same way. In many places birds help to keep malaria in check by eating malaria-carrying mosquitoes. Small animals which carry such diseases as plague, spotted fever and tularemia to man are eaten by hawks and owls.

Malaria is not only a disease of man but also of birds, and much valuable information about this disease has been gained by studying it in birds.

The great scientist Pasteur made some of his most important discoveries about immunizing men against diseases by experimenting with chickens sick with cholera.

Nowadays everyone hears about vitamins and their importance for health. Our first knowledge of vitamin B was gained from experiments with pigeons. Since then more has been learned about vitamins from experiments on birds.

Several human diseases — infantile paralysis, measles and smallpox—are caused by germs too small to be seen by microscopes. Such a germ is called a virus. Parrots suffer from a virus disease, psittacosis, and sometimes give it to humans. In studying these sick birds, doctors have learned much about this disease and virus diseases in general.

All of you know that one of the " captains of Death " among human diseases is tuberculosis. Birds also have a form of it. Study of bird tuberculosis has taught us several useful things in our fight against this great killer.

Miners deep in the earth must guard themselves against a deadly, odorless gas. Canaries are more susceptible to this gas than men and so miners carry them into mines to detect the gas. When the canaries become ill, miners know they must get out quickly.

Thus besides giving us pleasure, and destroying weeds and insects, birds help men to live a healthier life.

AUDUBON JUNIOR CLUBS

The National Audubon Society sponsors Audubon Junior Clubs in the interest of conservation. These clubs are intended to supplement school science programs. Ten or more children of any age may enrol as a junior club, elect officers and plan their own programs, adapting them to their own interests and geographic location. A teacher or other adult serves as an adviser. The National Audubon Society supplies its junior members with bird membership buttons, introductory bird study material and through its junior paper, suggestions for club activities. More than 6,000,000 children have been enrolled.

Upon receipt of the club's combined dues of ten cents a child for a school year, every club member receives a bird button and a set of six four-page bird leaflets, each containing a color plate and outline drawing for coloring. Each club receives News on the Wing, junior club paper, published four times during the school year. Every club of 25 or more members will receive Audubon Magazine. Materials are sent in one package to the club adviser.

Audubon Junior Clubs are nature clubs. Although the approach is through bird study, the text of the bird leaflets relates the bird to the plant and animal life in its environment, and thus helps to create a picture of the interdependence of all living things. It also covers the activity of birds throughout the year. The leaflets come in two editions: junior style (large type) recommended for grades below the sixth; senior style (small type) recommended for grade 6 and above. All leaflets describe birds common to the geographic location of the club, although not necessarily birds of the city.

Clubs may be enrolled by letter from the adult adviser with members' combined dues inclosed, stating how many sets of leaflets are desired in junior or senior styles. Send to: National Audubon Society, 1006 Fifth avenue, New York, N. Y.